Predictability of Extreme Returns in the Turkish Stock Market[☆]

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Abstract

In this paper, we show that extreme returns can predict future returns in the Turkish stock market. We find that extreme return (high MAX) generating stocks show a lower performance in the next month in this market. More explicitly, there is a strong negative relationship between the firm's maximum (MAX) daily returns over the previous month and its succeeding stock returns. Our results are robust in both firm-level cross-sectional, and portfolio-level analysis.

JEL Classification: G01, G21, G30, G32

Keywords: Turkey, Max effect, Extreme return

1. Introduction

Over the past few years, the financial economics literature has demonstrated that one can predict short-term returns of stocks which experience extreme returns in the current period. Bali et al. (2011) show a significant underperformance by the monthly portfolios consisting of stocks having high maximum daily returns (high MAX stocks) in comparison to the portfolios of stocks experiencing low maximum daily returns (low MAX stocks) over the prior month. Later, Nareta et al. (2014), Walkshäusl (2014), Zhong and Gray (2016), Chan and Chui (2016), and Wan (2018) study South Korean, European, Australian, Hong Kong and Chinese markets respectively to confirm the robustness of the MAX effect. However, a recent study by Aboulamer and Kryzanowski (2016) finds an opposite result in the Canadian stock market where there is a positive relationship between maximum returns in the previous month and returns in the next month. This conflicting result raises the question of the applicability of the MAX effect in individual stock markets of other countries and demands more research in this area. Moreover, it is essential to investigate whether the emerging markets also exhibit a MAX effect like the developed economies. Therefore, we chose Turkey to examine whether the evidence goes for or against the relevance of extreme returns over the recent period (2007-2017) and detect a significant MAX effect for this country. In contrary to our finding, Haykir (2018) finds no MAX anomaly in the Turkish stock market during the period between January 2011 and December 2017. However, this study covered a shorter period as well as a smaller number of firms that used in our study. The investors' preference for lottery-like assets, i.e., assets with a low probability of extreme positive payoff, is evident in Bali et al. (2011). This preference feature of investors is visible in the gambling markets despite low or negative expected returns. Moreover, Kumar (2009) finds that a specific group of investors prefer both gambling and lottery-like stocks- stocks with high idiosyncratic volatility and high idiosyncratic skewness. These investors may be overpricing the stocks with extreme positive returns in expectation for return persistence. Therefore, such stocks underperform in the future which reflects lottery preference of the investors. Such a lottery feature has a close relationship to higher moments of the distribution of returns, as demonstrated in several theoretical studies. These studies show an asset return skewness preference by the investors.[1] In equilibrium, by holding undiversified portfolios, investors who seek skewness can manage to earn negative alphas in stocks with high negative skewness. Boyer, Mitton, and Vorkink (2007) denote skewness preferring investors as “lotto investors”. Tversky and Kahneman (1992), and Barberis and Huang (2008) show that investors overweight the extreme events with low probabilities. If the return distribution is non-normal, then there is a negative excess return for skewed securities which is overpriced.

In a recent article, Alkan and Guner (2018) show the investor’s preference for lottery stock at Borsa Istanbul. The results are very much in line with our paper. Here they also use both Fama Macbeth (1973) cross-section regression and portfolios approach to demonstrate investor’s overpricing tendency of MAX stocks. However, in addition to the negative MAX effect, we also show that MAX effect is persistent in the Turkish market. Moreover, we demonstrate a negative idiosyncratic volatility puzzle in the Turkish market. Even after putting highly correlated MAX as a control with IVOL, the puzzling negative relation between lag IVOL and return is not banished entirely from the Turkish market. This paper contributes to the existing literature of financial economics in the scope of MAX effect in international financial markets. More specifically, we show a strong MAX effect in an emerging market supporting the findings of Bali et al. (2011) for

[1] See Arditti (1967, 1971); Kraus and Litzenberger (1976); Simkowitz and Beedles (1978); Conine and Tamarkin (1981); Kane (1982); Harvey and Siddique (2000); Brunnermeier and Parker (2005); and Brunnermeier et al. (2007).

developed economies. We also show a robust negative relationship between idiosyncratic volatility and stock returns in the Turkish equity market. Ang et al. (2006) first show that idiosyncratic volatility has a negative relation with stock returns. However, this finding is controversial, and Bali et al. (2011) show that after controlling for the MAX effect, one can find an opposite result of the conclusions of Ang et al. (2006). Following Bali et al. (2011), numerous other studies confirm the MAX effect using data from markets outside the US.

Interestingly, Chee (2012) detects a MAX effect in the Japanese market with bivariate sorts only after controlling for firm characteristics but does not find any such result with single portfolio sorts. Similarly, Annaert et al. (2013) find evidence of a MAX effect in 13 European countries using cross-sectional regressions and two-stage portfolio sorts after controlling for potential confounding influences while detecting the weak existence of this effect using univariate portfolio sorts. Walkshäusl (2014) also confirms the presence of MAX effect in 11 European Monetary Union countries after applying a series of multivariate regressions. This series of mixed results motivate us for further research on MAX effect for other countries- especially emerging markets.

Current literature is investigating the MAX effect in the emerging markets. Nareta et al. (2014) show that only equal-weighted portfolios exhibit a MAX effect in South Korea implying the existence of a small-firm premium. This is out-of-sample mixed evidence of the MAX effect. This brings forth the question of the magnitude of the MAX effect for weighted and unweighted portfolios in other emerging markets. Cheon and Lee (2017) sort 44 countries into geographical regions and generalize the findings of Bali et al. (2011) to a lot of global markets. However, it is also essential to identify the magnitude of the MAX effect for country-specific equity markets. In this paper, we show that the Turkish equity market exhibits a significant MAX effect in both weighted and unweighted portfolios.

The literature is also studying other determinants and their interaction with the MAX effect for cross-sectional returns in the US. Chen and Petkova (2012) show that high MAX stocks come with high R&D expenditures implying that high growth opportunities are included in the price and MAX is the signal for that. Han and Kumar (2013) document that speculative retail investors trade lottery-like stocks heavily because they exhibit a strong gambling preference. Fong and Toh (2014) document that the significance of the MAX effect is mostly influenced by institutional ownership and investor sentiment. Stocks with low institutional ownership usually have the strongest MAX effect, and the MAX effect follows only high-state sentiment. Frazzini and Pedersen (2014) show that a 'betting against beta' strategy can earn an abnormal return by taking a long (short) position in stocks with low (high) beta. However, Bali et al. (2014) show, later, that after controlling for MAX, such an abnormal return is non-existent.

In this paper, we study the cross-sectional return predictability of extreme returns using a recent sample in a small integrated emerging market - Turkey. Consistent with the US and European evidence, we get similar results of an adverse relation between each month's maximum daily return and succeeding month's stock returns in the Turkish equity market. Bali et al. (2008) show a -1.03% monthly return difference among the portfolios with the highest and the lowest maximum daily return. We find that in the Turkish market, the monthly return difference is -1.37% between the highest and the lowest max return generating portfolios. The results of all Fama-Macbeth (1973) regressions (where main independent variables are lag MAX) are also consistent with both the US and European evidence from Bali et al. (2008) and Walkshäusl (2014). All these results show a significant negative relation between return and those three independent variables. We also show that the inclusion of lag MAX as a control with lag IVOL reduce the magnitude of the coefficient of both lag MAX and lag IVOL which indicates that these two variables could be proxies for each other.

The remainder of the paper advances as follows. Section 2 explains the sources and characteristics of data in 2.1 and methodology in 2.2. Section 3 presents the results with subsections 3.1 for portfolio-level analysis, 3.2 for the MAX effect, 3.3 for MAX and the idiosyncratic volatility puzzle, and 3.4 for the robustness check of the results. Section 4 concludes the paper.

2. Data and Methodology

2.1 Data

Our sample includes daily stock price data of all active equities (an average of 246 firms each year) listed in Borsa Istanbul denominated in local currency for the period from January 2007 to January 2017. We start our sample from 2007 because we want to check the effect of extreme returns for the most recent periods. We conduct a subsample analysis for the period from January 2010 to January 2017 to eliminate the impact of the financial crisis of 2008. We use the BIST 100 return index as a market return, and the risk-free rate is the 10-year government bond rate (downloaded from yahoo finance). All other data is downloaded from the Datastream database.

Using the daily stock return, we calculate the variables stock return ($return_{i,t}$), maximum daily return over the previous month ($MAX_{i,t}$), momentum ($MOM_{i,t}$), short-term reversaa l ($REV_{i,t}$), skewness ($SKEW_{i,t}$), market beta ($BETA_{i,t}$), and idiosyncratic volatility ($IVOL_{i,t}$) at monthly interval. $return_{i,t}$ is the average of daily stock returns for firm i during the month of t. For a given firm, we calculate the daily stock return as the logarithmic difference of daily stock prices. $MAX_{i,t}$ is the maximum daily return in the month $t-1$ for the firm i. For $n = 2, \ldots, 5$, we calculate $MAX(n)_{i,t}$ as the average of n maximum daily returns for firm i during the month $t-1$.

By following Jegadeesh and Titman (2001), we calculate the momentum variable $MOM_{i,t}$ as the cumulative return of stock i for 11 months over the period from $t-2$ to $t-12$. The short-term reversal variable $REV_{i,t}$ is the daily average return of stock i in month $t-1$ (Jegadeesh (1990), Lehmann (1990)). $SKEW_{i,t}$ is calculated as the skewness of daily stock returns of firm i during the month $t-1$. $SIZE_{i,t}$ is calculated by the natural logarithm of the market value of the equity of stock i in month $t-1$. Illiquidity($ILLIQ_{i,t}$) is the absolute daily average stock return over a month divided by its trading volume of stock i in month $t-1$. Book-to-market ($BM_{i,t}$) is the ratio of book equity to market equity of stock i in month $t-1$.

We use the model in equation (1) to estimate the firm-specific systematic risk $beta_{i,t}$ and idiosyncratic volatility $ivol_{i,t}$. Specifically, we use the daily stock returns of month $t-1$ to estimate the equation.

$$R_{i,d} - r_{f,d} = \alpha_i + \beta_i (R_{m,d} - r_{f,d}) + e_{i,d} \quad (1)$$

The market BETA of stock *i* in month *t* is $\widehat{\beta_i}$ and the idiosyncratic volatility of stock *i* in month *t* is $ivol = \sqrt{var(e_{id})}$.

[Insert table 1 here]

Table 1 presents the descriptive statistics of the variables used in this paper. Panel A shows that the equally weighted average stock return is 5.544% per year with yearly volatility of approximately 70%. An average firm in our sample has a maximum daily return over the previous month of 5.612% with a standard deviation of 4.107 and the average idiosyncratic volatility 2.351. The mean market beta is 0.322, momentum 0.02, short-term reversal 0.017 and skewness 0.141.

Panel B exhibits the average value-weighted stock return is 9.072% per year with yearly volatility of approximately 74.928%, which is higher than for the equally weighted return. The maximum daily return over the previous month is 5.863% with a standard deviation of 6.233. The average idiosyncratic volatility is 2.389. The main variables of interest are similar for both portfolios. The mean market beta is 0.322, momentum 0.351, short-term reversal 0.03 and skewness 0.156 which are marginally higher than those for the equally weighted return statistics.

2.2 Methodology

We use both a portfolio level analysis and the cross-sectional Fama-MacBeth (1973) regression[2] framework to estimate the MAX effect. With the advantage of being non-parametric, the portfolio-level analysis does not have a functional form on the relation between MAX and future return. (Bali et al. 2008).

On the other hand, the firm-level cross-sectional analysis helps to capture information that is eliminated in portfolio level analysis through aggregation. Furthermore, cross-sectional analysis helps to control for the effect of other variables which is difficult in portfolio level analysis. To address these issues, we focus on Fama–MacBeth (1973) cross-sectional analysis in this paper.

3. Results

3.1 Portfolio level analysis

At first, we present portfolio level analysis to demonstrate that extreme return generating stocks exhibit a lower performance in the future. We create ten equally and value-weighted portfolios based on extreme returns. Portfolio 1 (low MAX) includes stocks belonging to the

[2] Details of Fama Macbeth (1973) is in the supplementary text

lowest portfolio[3] of maximum daily returns over the previous month, and portfolio 10 (High MAX) represents the stocks in the top portfolio of maximum daily returns over the past month.

[Insert table 2 here]

Table 2 presents the results for the MAX effect. Panel A shows that the highest MAX portfolio generates a loss of 10.580% per year, and the lowest MAX portfolio generates a return of 5.796% per year. The return difference between these two portfolios is 16.376%. In all cases, the difference is statistically significant. The return difference is a little smaller for the value-weighted portfolio. In general, the return for each of the ten portfolios is higher for the value-weighted portfolios. The higher return (i.e., lower loss) for the High MAX portfolio produces a smaller return for the self-financing portfolio. The Fama French three-factor alpha differences for equally weighted portfolios is -1.567 with a *t*-statistic of -2.692 and -1.094 with a *t*-statistic of -1.722. We also note that alpha returns of individual portfolios are not significant. The extreme high MAX portfolio generates an alpha value of -1.427 with a *t*-statistic of -1.313 in the case of the equally weighted portfolios and an alpha value of -0.736 with a *t*-statistic of -0.635 in the case of the value-weighted portfolios. The result is consistent with both the US and European evidence of Bali et al. (2011) and Walkshäusl (2014) in the case of MAX portfolios. We observe that the highest MAX portfolio has the lowest performance among all portfolios.

Our results show that the extreme MAX portfolio exhibits the lowest return in conformance with both the optimal expectations framework and the cumulative prospect theory. This extreme MAX portfolio may contain lottery-type stocks with a small probability of substantial positive

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[3] We formed 9 portfolios with same number of stocks and put extra stocks in 10th portfolio if the number of stocks is not devisable by 10

returns. A high MAX effect indicates the investor's inclination towards overpricing MAX stocks. Hence, it is plausible that behavioral biases influence investors. In addition, abundant evidence suggests that individual investors driven by emotions and behavioral biases cause a strong negative MAX effect. In the Turkish equity market, the equal-weighted portfolios show a stronger MAX effect than do the value-weighted portfolios, indicating that lottery-type stocks are mainly small-cap stocks (Kumar, 2009).

[Insert table 3 here]

We prepare an average month-to-month portfolio transition matrix presented in table 3. It shows the proportion of stocks that shifts from one portfolio to another portfolio in the subsequent month. The diagonal elements indicate that what portion of stocks remains in the same portfolio in the following month. Here, consistent with Bali et al. (2011, 2017) all the diagonal elements of the transition matrix exceed 10% for all portfolios meaning that MAX effect is persistence. This persistence is strong for extreme portfolios. Diagonal elements of both extreme portfolios are more than 20% and 25%.

[Insert figure 1 here]

In Figure 1 we report a monthly time-series plot of the 10-1 return spread from January 2007 to January 2017. The blue bars are those periods (July 2007 to December 2012) when a decline in economic activity lead to the Great Recession. In figure 1 we observe higher spread during the period of downward economic movement.

[Insert table 4 here]

Table 4 shows the double-sorted portfolio return for five sets of portfolios by controlling momentum (MOM), skewness (SKEW) and idiosyncratic volatility (IVOL). Here, first, we sort the individual stocks based on the three control variables. Then within each portfolio, we sort stocks again based on MAX. Hence the total number of portfolios are 3×3. After that, the average return of these portfolios is reported as low MAX to High MAX portfolios. We present both equally and value-weighted portfolios in table 4. A drawback of sorting using correlated variables simultaneously is that they do not appropriately control for the control variable (Bali et al. 2008). Therefore, we avoid reporting bivariate sort of all variables as it may produce ambiguous results. In both single and two-stage sorting, the low MAX stocks have a better return, and the return difference between the extreme portfolios is significant. We reduce the number of portfolios 10 to 3 because 246 firms are a too small number to create 10 (10) portfolios. We report MAX (n=1,2,3,4,5) portfolio sorts in the supplementary text.

3.2 The MAX effect in Fama-MacBeth (1973) regressions:

We use the following regression model to measure the MAX effect on the Turkish stock market:

$$R_{i,t+1} = \gamma_{0,t} + \gamma_{t,1} MAX(n)_{i,t} + \gamma_{t,2} BETA_{i,t} + \gamma_{t,3} SIZE_{i,t} + \gamma_{t,4} BM_{i,t} + \gamma_{t,5} MOM_{i,t} + \gamma_{t,6} ILLIQ_{i,t} + \gamma_{t,7} REV_{i,t} + \gamma_{t,8} SKEW_{i,t} + \varepsilon_{i,t+1} \quad (2)$$

[Insert table 5 here]

Table 5 presents coefficients from monthly Fama-MacBeth (1973) regressions of the monthly average of daily returns on lagged maximum returns value. In Panel A of Table 5 initially, we have a significant negative coefficient of -.007 with a *t*-statistic of -5.323 when the maximum daily return over the prior month is the only predictor of expected performance. However, when we include other control variables, the return prediction capacity of lag MAX becomes even higher. Since lag MAX is associated with many other variables, introducing those control variables reveals the more robust return effect related to MAX. Turkish market exhibits evidence like the US and European markets, with a significant negative relationship between the maximum daily return over the prior month and stock returns over the current month.

Returns are also significantly negatively related to momentum in panel B. This result indicates that extreme return generating stocks perform poorly in the next period. This evidence is an indication of investor's preferences for lottery-type stocks with a very little chance of extreme high return. In contrast, we do find that there is no return predicting the capacity of beta which can explain the average stock returns in the cross-section. Additionally, we do not get any reliable size effect. These results are in line with prior evidence on beta and size effects in the U.S. and other equity markets (e.g., Fama and French, 1992; Hou et al., 2011, Fama and French, 2012). Skewness does not have a statistically significant impact in our sample. Bali et al. (2011) obtained similar results for skewness.

3.3 Robustness tests

We use a sub-sample analysis for the period from January 2010 to January 2017 to conduct the Fama-Macbeth regression to check the robustness of our results after excluding the effect of the financial crisis of 2008.

[Insert table 6 about here]

In panel A of table 6, all estimated coeffects are highly significant for lagged MAX, indicating a robust negative relationship between current return and lagged maximum return. In model 1 including only lagged MAX, the estimated coefficient is -0.007, with a *t*-statistic of -4.708. The size of the coefficients is roughly similar after adding different controls. However, the magnitude of the MAX-effect is stronger for the equally weighted portfolios than for the value-weighted. In model 1 of panel B, including only lagged MAX the estimated coefficient is 0.004

with a *t-statistic* of -3.330. After adding controls, the results are almost similar. The stronger negative relation between return and lagged MAX for the equally weighted portfolios indicates that small-cap companies have a higher max effect than the big-cap firms. This conclusion is not surprising because investors tend to gamble on small speculative stocks.

[Insert table 7 about here]

In table 7, the data is split into subsamples according to the firm size. Firms below the median value are considered as small firms, and firms above the median are considered as large firms. The results show that small firms exhibit the same MAX effect as that of big companies. However, when we keep only the top 20% firms in each category, the result shows that small firms have a significant negative MAX effect, but large firms do not have MAX effect in that magnitude. This result supports the hypothesis that large firms exhibit a lower MAX effect than the small firms in the Turkish maker.

[Insert table 8 about here]

Finally, we demonstrate that the MAX effect is persistent also with US dollar-denominated returns. In table 8, we find that in model 1 the MAX coefficient is -0.004 with a t-statistic -4.875 and in model 2 after inserting all relevant control MAX coefficient is -0.005 with a *t-statistic* of -4.673.

4. Conclusion

Using the U.S. stock data, Bali et al. (2011) show that stocks with high maximum daily returns over the prior month underperform in the following month compared to stocks experiencing low maximum daily returns over the same period. Recent evidence of a positive MAX effect is shown by Aboulamer and Kryzanowski (2016) which is precisely opposite to U.S. evidence. The contradictory evidence renders this issue even more puzzling, suggesting an urgency for studying possible country-specific MAX effects. In the Turkish stock market, we observe that MAX coefficients are significantly negative, implying that the extreme maximum return generating stocks have poor performance in the next month. The negative MAX effect is expected because there is plenty of evidence in the contemporary literature indicating a persistent negative MAX effect in various emerging and developed markets. The overall results show that Turkish investors have a high tendency to speculation on stocks by overpricing the MAX stocks. Our result provides evidence of poorly diversified Turkish portfolios, with investors preferring lottery-type stocks. In this paper, we only examine the MAX effect on the Turkish equity market, leaving two questions for future research. First, is the reversal of returns for MAX portfolios in the succeeding month related to investor attention and their portfolio reshuffling decisions at the end-of-the-month. Second, is this MAX effect related to global or local sentiments?

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Table 1: Summary Statistics

Panel A: Summary Statistics of variables for Equal-weighted return

Variables	mean	sd	median	min	max	skew	se
return	0.022	0.639	0.000	-8.144	10.901	0.401	0.004
MAX	5.612	4.107	4.438	0.000	194.872	6.302	0.024
IVOL	2.351	1.486	1.981	0.009	42.891	2.835	0.009
BETA	0.322	0.293	0.284	-3.685	5.560	0.991	0.002
SIZE	573066	4003982	3434	8.030	81311281	13.899	23321.9
BM	0.882	1.082	0.806	-33.333	9.091	-5.995	0.006
MOM	0.020	0.655	0.000	-8.144	10.901	0.368	0.004
REV	0.017	0.636	0.000	-8.144	10.901	0.422	0.004
ILLIQ	0.001	0.022	0.000	0.000	3.052	104.24	0.000
SKEW	0.141	0.871	0.127	-4.188	3.971	-0.050	0.005

Panel B: Summary Statistics of variables for value-weighted return

Variables	mean	sd	median	min	max	skew	se
return	0.036	0.684	0.000	-10.546	14.135	1.318	0.004
MAX	5.863	6.233	4.431	0.000	266.132	13.740	0.037
IVOL	2.389	1.794	1.973	0.015	59.473	7.072	0.011
BETA	0.322	0.291	0.282	-1.382	4.161	0.899	0.002
SIZE	5298418	1961057	5200155	73250	10698965	0.295	11584
BM	0.879	1.093	0.806	-33.333	9.091	-6.007	0.006
MOM	0.351	2.303	0.194	-13.700	15.882	0.443	0.014
REV	0.030	0.677	0.000	-10.546	14.135	1.270	0.004
ILLIQ	0.001	0.023	0.000	0.000	3.051	93.415	0.000
SKEW	0.156	0.905	0.131	-4.188	4.175	0.136	0.005

Note: This presents the descriptive statistics of return which is the daily avg. Over a month and in % format., maximum daily return over the previous month (MAX), idiosyncratic volatility over the last month (IVOL), market beta (BETA), momentum (MOM), a short-term reversal (REV), and skewness (SKEW).

Table 2: Portfolio return based on MAX

Portfolios	EW			VW		
	Avg. Return	FF Alpha	t stat	Avg. Return	FF Alpha	t stat
Low MAX	0.023	0.140	0.165	0.034	0.358	0.432
2	0.046	0.338	0.388	0.056	0.591	0.711
3	0.047	0.430	0.497	0.053	0.474	0.582
4	0.042	0.170	0.195	0.049	0.408	0.493
5	0.035	0.163	0.187	0.053	0.280	0.319
6	0.025	-0.237	-0.269	0.045	0.271	0.318
7	0.038	0.333	0.385	0.043	0.386	0.459
8	0.021	-0.146	-0.163	0.034	0.351	0.419
9	0.001	-0.529	-0.65	0.030	0.119	0.150
High MAX	-0.042	-1.427	-1.313	-0.017	-0.736	-0.635
Diff 10-1	-0.065 (-2.410)	-1.567	-2.692	-0.051 (-2.392)	-1.094	-1.722

Note: The results present the average daily return and Fama French three-factor alpha of the ten portfolios of each month formed from January 2007 to January 2017 of average 246 Turkish firms based on the maximum returns in previous months. The ten portfolios are shaped each month by assigning all stocks of each period based on MAX variable. The last row represents the return and Alpha difference between two extreme portfolios. Returns are the daily avg. over a month and which are in % format

Table 3: Portfolio average transition probability matrix based on MAX

	Low MAX	2	3	4	5	6	7	8	9	High MAX
Low MAX	0.206	0.132	0.101	0.104	0.090	0.084	0.076	0.064	0.067	0.076
2	0.131	0.128	0.121	0.104	0.096	0.093	0.088	0.076	0.070	0.093
3	0.119	0.115	0.116	0.116	0.101	0.087	0.095	0.082	0.078	0.090
4	0.095	0.123	0.113	0.103	0.112	0.108	0.092	0.090	0.072	0.092
5	0.094	0.103	0.107	0.107	0.115	0.111	0.092	0.089	0.082	0.099
6	0.079	0.102	0.111	0.097	0.106	0.110	0.115	0.095	0.091	0.095
7	0.077	0.088	0.089	0.098	0.105	0.122	0.110	0.103	0.092	0.115
8	0.070	0.076	0.091	0.101	0.089	0.107	0.115	0.123	0.107	0.122
9	0.058	0.074	0.080	0.091	0.088	0.083	0.099	0.132	0.146	0.149
High MAX	0.056	0.047	0.056	0.063	0.078	0.076	0.095	0.117	0.155	0.257

Note: We sort ten portfolios in every period (month) from January 2007 to January 2017 based on the maximum daily returns (MAX) over the past one month. The table shows the average of the month-to-month transition matrices for the stocks in these portfolios, i.e., the average probability that a stock in i (i is the rows of the matrix) in one month will be in j (j is the columns of the matrix) in the subsequent month

Table4: Double Sorted Portfolio return based on MAX and other Characteristics

Panel A: Double sorted equal-weighted portfolio return

	MOM	SKEW	IVOL
Low MAX	2.190	2.784	2.634
2	1.872	2.456	3.097
High MAX	1.349	0.172	-0.320
Diff 3-1	-0.841	-2.612	-2.954
t stat	(-0.994)	(-3.406)	(-3.002)

Panel B: Double sorted value-weighted portfolio return

	MOM	SKEW	IVOL
Low MAX	4.045	3.959	3.273
2	3.152	3.408	3.917
High MAX	1.399	1.228	1.406
Diff 3-1	-2.646	-2.731	-1.867
t stat	(-2.579)	(-3.443)	(-1.787)

Note: The results present the average daily return of the 3 (3) portfolios of each month formed from January 2007 to January 2017 of average 246 Turkish firms based on maximum returns in previous months by controlling momentum (MOM), skewness (SKEW) and idiosyncratic volatility (IVOL). The last row represents the return difference between two extreme portfolios. Returns are the daily avg. over a month and which are in % format

Table 5: Cross-sectional regression for MAX effect

Panel A: Regressing the monthly average of equally weighted daily stock returns on MAX and controls

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
MAX	-0.007*** (-5.323)	-0.008*** (-5.405)	-0.008*** (-5.340)	-0.009*** (-4.977)	-0.007*** (-5.248)	-0.007*** (-5.081)	-0.007*** (-5.286)	-0.008*** (-5.650)
BETA		-0.026 (-1.228)	-0.028 (-1.324)	-0.026 (-1.220)				
SIZE			0.000 (-0.107)	0.000 (-0.198)	0.000 (-0.426)			
BM			0.017*** (3.371)	0.018*** (3.584)		0.017*** (3.303)		
MOM			-0.012 (-1.578)	-0.012 (-1.530)			-0.013 (-1.753)	
ILLIQ				33.588* (2.030)				33.418* (1.986)
REV				-0.002 (-0.141)				
SKEW				0.009 (1.267)				

Panel B: Value Weighted Fama-MacBeth regression

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
MAX	-0.005*** (-4.179)	-0.005*** (-4.389)	-0.005*** (-4.402)	-0.006*** (-4.394)	-0.005*** (-4.633)	-0.005*** (-3.798)	-0.005*** (-4.294)	-0.005*** (-4.334)
BETA		-0.037 (-1.721)	-0.029 (-1.402)	-0.021 (-1.029)				
SIZE			0.000 (-1.580)	0.000 (-1.431)	0.000** (-2.601)			
BM			0.028*** (3.659)	0.030*** (3.882)		0. 0.029*** (3.702)		
MOM			-0.008** (-2.868)	-0.008** (-2.844)			-0.010*** (-3.311)	
ILLIQ				46.541** (3.191)				43.144** (2.972)
REV				-0.000 (-0.016)				
SKEW				0.004 (0.664)				

Note: This table reports the monthly Fama Macbeth cross-sectional regression slope coefficients, and their associated Newey-West (1987) adjusted t-statistics for the equation (2) and nested versions thereof for the period from Jan-2007 to Jan-2017. We regress the monthly stock return on a set explanatory variable that includes maximum daily return over the previous month (MAX), market beta (BETA), book market ratio (BM), momentum (MOM), illiquidity (ILLQ), short-term reversal (REV), firm Size (SIZE), and skewness (SKEW).

Table 6: Fama-MacBeth cross-sectional regression using Lag MAX from 2010

Panel A: Fama-MacBeth regression on the monthly average of daily stock return on MIN and controls

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
MAX	-0.007***	-0.007***	-0.007***	-0.009***	-0.007***	-0.007***	-0.007***	-0.007***
	(-4.708)	(-4.807)	(-4.557)	(-4.716)	(-4.678)	(-4.520)	(-4.629)	(-5.155)
BETA		-0.032	-0.033	-0.029				
		(-1.246)	(-1.279)	(-1.119)				
SIZE			0.000	0.000	0.000			
			(-0.063)	(-0.324)	(-0.390)			
BM			0.014**	0.014**		0.012*		
			(2.596)	(2.670)		(2.382)		
MOM			0.002	0.000			-0.000	
			(0.180)	(0.043)			(-0.027)	
ILLIQ				29.896				28.460
				(1.259)				(1.223)
REV				-0.008				
				(-0.578)				
SKEW				0.011				
				(1.408)				

Panel B: Value Weighted Fama-MacBeth regression

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
MAX	-0.004***	-0.005***	-0.005***	-0.006***	-0.005***	-0.004**	-0.004**	-0.005**
	(-3.330)	(-3.577)	(-3.537)	(-3.732)	(-3.635)	(-3.017)	(-3.443)	(-3.537)
BETA		-0.045	-0.039	-0.027				
		(-1.705)	(-1.604)	(-1.111)				
SIZE			0.000	0.000	0.000			
			(-1.243)	(-1.118)	(-1.922)			
BM			0.029**	0.030***		0.027**		
			(3.252)	(3.357)		(3.164)		
MOM			-0.001	-0.001			-0.002	
			(-0.277)	(-0.303)			(-0.770)	
ILLIQ				45.517*				41.689*
				(2.264)				(2.094)
REV				-0.005				
				(-0.500)				
SKEW				0.005				
				(0.739)				

Note: This table reports the monthly Fama Macbeth cross-sectional regression slope coefficients, and their associated Newey-West (1987) adjusted t-statistics for the equation (2) and nested versions thereof for the period from Jan. 2010-Jan. to Jan-2017. We regress the monthly stock return on a set explanatory variable that includes maximum daily return over the previous month (MAX), market beta (BETA), book market ratio (BM), momentum (MOM), illiquidity (ILLQ), short-term reversal (REV), firm Size (SIZE), and skewness (SKEW).

Table 7: Fama-MacBeth cross-sectional regression for small and big firms

	Small Firms		Large Firms		Small Firm (top 20%)		Large Firms (top 20%)	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
MAX	-0.006*** (-3.685)	-0.008*** (-3.342)	-0.007*** (-3.385)	-0.008*** (-3.404)	-0.009*** (-3.890)	-0.011*** (-3.665)	-0.005 (-1.709)	-0.008 (-1.944)
BETA		-0.002 (-0.067)		-0.025 (-1.045)		0.014 (0.330)		-0.010 (-0.312)
SIZE		0.000 (-0.448)		0.000 (0.158)		0.000* (-2.015)		0.000 (-0.304)
BM		0.015** (2.797)		0.040*** (5.608)		0.005 (0.811)		-0.003 (-0.157)
MOM		0.002 (0.231)		-0.015 (-1.482)		-0.003 (-0.179)		28.151 (1.383)
ILLIQ		131.240*** (3.717)		26.452 (1.637)		172.290** (3.009)		-0.012 (-0.529)
REV		0.009 (0.671)		-0.014 (-0.855)		-0.003 (-0.155)		-0.003 (-0.193)
SKEW		0.010 (1.144)		0.005 (0.493)		0.020 (1.488)		-0.008 (-1.944)

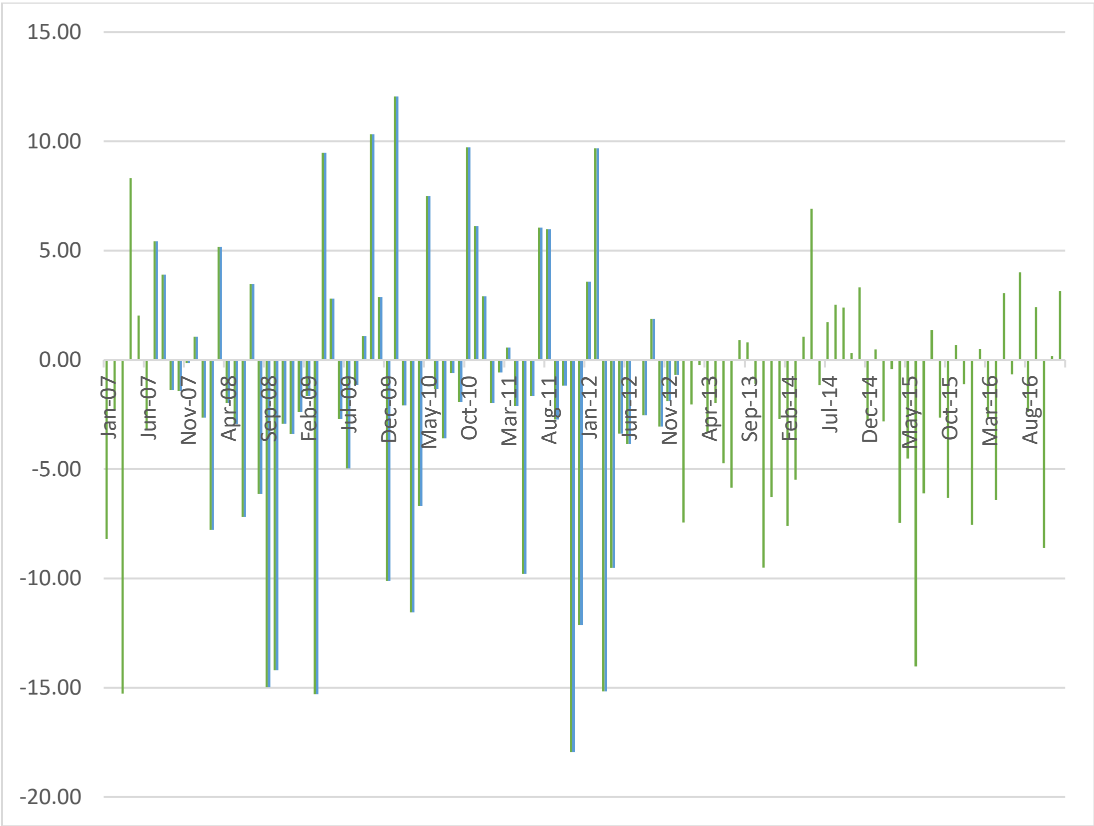
Note: This table reports separate the monthly Fama Macbeth cross-sectional regression slope coefficients, and their associated Newey-West (1987) adjusted t-statistics for small and large firms

Table 8: Fama-Macbeth (1973) cross-sectional regression using US dollar-denominated returns

	(1)	**(2)**
MAX	-0.004*** (-4.875)	-0.005*** (-4.673)
BETA		-0.016 (-1.295)
SIZE		0.000 (-0.106)
BM		0.011*** (3.338)
MOM		-0.009* (-2.029)
ILLIQ		23.384* (2.037)
REV		0.000 (0.035)
SKEW		0.005 (1.196)

Note: This table reports separate the monthly Fama Macbeth cross-sectional regression slope coefficients, and their associated Newey-West (1987) adjusted t-statistics after using US dollar-denominated return

Figure 1: Monthly time-series plot of the 10-1 return spread from January 2007 to January 2017



Note: Monthly time-series plot of the 10-1 return spread from January 2007 to January 2017. The blue bars represent the years that are affected by the global recession.